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## RESEARCH ARTICLE

### INTERCROPPING OF DWARF FIELD PEA (PISUM SATIVUM) AND INDIAN MUSTARD (BRASSICA JUNCEA) FOR DRY LAND AREA OF UTTAR PRADESH

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#### ABSTRACT

The field experiment was laid out during two consecutive years under Operational Research Project for Resources Development on Watershed Basis, Randher, Jalaun district of Bundelkhand (U.P.). The main objective was to find out the suitable cultivar of field pea for intercropping with Indian mustard for better yield and net return. The experimental area is situated in the catchments of Pahuj river. The soil of pilot project was clay loam locally known as Kawar, having low organic carbon, total nitrogen available P<sub>2</sub>O<sub>5</sub> and high available K<sub>2</sub>O. Two spreading nature cultivars of field pea i.e., T 163 and Rachana and one dwarf field pea cv. Aparna (H.F.P. 4) were tested in intercropping of Indian mustard cv. Varuna. Under sole cropping cultivar Aparna gave highest yield of 29.90q/ha. The cv. T 163 produced 24.10q /ha grains. The improved cultivar Rachana yielded 26.00 q/ha kernels. In intercropping the varietal performance was Aparna (26.40 q/ha)>Rachana (23.10 q/ha)> T163 (21.50q/ha). The highest yield of intercrop Indian mustard was reaped by 6.05 q/ha from Aparna+Indian mustard cropping system, while other both cropping systems gave poor yield. Intercropping of Aparna+Indian mustard gave highest yield advantage (14%), maximum system productivity. (35.47q/ha) and higher system net profitability (Rs 66820/ha) in comparison to other two cropping systems.

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## INTRODUCTION

Before the introduction of dwarf field pea cultivation in Bundelkhand region of Uttar Pradesh, the old and spreading nature cultivars of field pea were cultivated tit-bit in lentil growing tract. Lentil cv. 'Malka' was the major pulse crop, which was growing since 1962 in Bundelkhand part of Uttar Pradesh. The cultivation of dwarf field pea was introduced in 1988 from Operational Research Project for Resource Development on Watershed Basis, Rendhar, Jalaun, Bundelkhand (ICAR-Project), where it gave very good kernel yield. Thereafter, the area under cultivar Aparna (H.F.P.-4) spread like to forest fire in whole Bundelkhand region of Uttar Pradesh. The area of lentil was reduced due to incidence of diseases and cultivated area of dwarf field pea increased because no complexity of insects, pest and diseases.

The feedback received from the farmers field that they mixed the seed of Indian mustard with the seed of spreading nature cultivars of field pea and shown without any agronomical consideration.

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At growth stage the traditional varieties of field pea climbed on plants of Indian mustard, resulted in, the poor seed yield reaped from the mixed stand of Indian mustard and the loss accruing, there from, was not adequately compensated by the additional income, which they earn through the production of Indian mustard. It has therefore, been felt necessary to evolve some better way intercropping practice, which can successfully replace the above mentioned problem by enhancing the overall income of farm families at the same time giving them a cash return within a short period of time. Singh *et al.* (2016) reported from C.S. Azad University of Agriculture and Technology, Kanpur that dwarf field pea+ Indian mustard is suitable intercropping system for degraded lands. With this object in view the present study on companion cropping of Indian mustard with different varieties of field pea was planned and undertaken.

## MATERIALS AND METHODS

The study was undertaken during Rabi season of 1990-91 and 1991-92 at Pilot Project of Watershed, Rendhar, Jalaun, Bundelkhand (U.P.) under rain fed condition. The operational area of watershed typically represents soil, climate and socio-economic condition of Bundelkhand region.

The moisture availability period for crop growth is 122 days. The soil of pilot project site developed over alluvial and occurs ravines affected. The ravines affected area belongs to class II and III of land capability class and were suitable for cultivation of field pea and Indian mustard. The experimental soil was clay loam locally known as Kawar, having pH 8.0, organic carbon 0.27%, total nitrogen 0.02%, available P<sub>2</sub>O<sub>5</sub> 9.8 Kg/ha and available K<sub>2</sub>O 252 Kg/ha, therefore, the analyzed status of nutrients was indicated poor. The pH was determined by Electrometric glass electrode method (Piper, 1950), while organic carbon was determined by Colorimetric method (Datta et al., 1962). Total nitrogen was analyzed by Kjeldahl's method as discussed by Piper (1950). The available phosphorus and potassium were determined by Olsen's method (Olsen et al., 1954) and Flamephotometric method (Singh, 1971), respectively. The two spreading nature cultivar of field pea i.e., T.163 and Rachana and one dwarf field pea cv. Aparna (H.F.P. 4) were tested in companion cropping of Indian mustard cv. Varuna. The showing of both crops in pure and intercropping was done in second fortnight of November and harvested in second fortnight of March after 125 days of showing during two experimental seasons. In companion cropping, the rows ratio was maintained 5:1 between field pea and Indian mustard. Five row of field pea was shown first followed by one row of Indian mustard. By this showing method whole field was sown. Under irrigational management, protective irrigations were given as and when required. The conservation practices and smart agronomy were followed for raising of crops in intercropping. The showing was done in north-south direction to avail the benefit of sun rays. The experiment was laid out on five farmer's fields.

## RESULTS AND DISCUSSION

The experimental findings as influenced by different sole and companion cropping are discussed below under appropriate heads.

**Table 1. Yield of field pea, Indian mustard, system productivity and system net profitability under sole and intercropping system (Pooled data of two years)**

S.No.	Treatment	Yield (q/ha.)		LER	Yield advantage (%)	System productivity (q/ha)	System net profitability (Rs/ha)
		Main crop	Intercrop				
1.	Field pea cv. T 163	24.10	-	1.00	-	24.10	32710.00
2.	Field pea cv. Rachana	26.00	-	1.00	-	26.00	38410.00
3.	Field pea cv. Aparna	29.90	-	1.00	-	29.90	50110.00
4.	Indian mustard cv. Vaurma	23.30	-	1.00	-	34.95	65260.00
5.	T 163+Indian mustard	21.50	3.20	1.03	3.00	26.05	38560.00
6.	Rachana+Indian mustard	23.10	3.25	1.03	3.00	27.97	44320.00
7.	Aparna+ Indian mustard	26.40	6.05	1.14	14.00	35.47	66820.00

### Response of cultivars under sole and companion cropping:

The data given in Table-1 displayed variation due to different tested cultivar for seed yield (q/ha). Variety Aparna registered highest seed yield of 29.90 q/ha. The cv. T 163 gave lowest yield by 24.10 q/ha in sole cropping. Thus, it is clear that dwarf field pea Aparna proved superior over long and spreading nature cultivars T-163 and Rachana in sole cropping. These results are in agreement with those reported by Singh (1999) and Singh *et al.* (2018). In intercropping system, the varietal performance of field pea was Aparna (26.40 q/ha)>Rachana (23.10 q/ha)> T 163 (21.50 q/ha). These results indicate that the genotype Aparna produced highest seed yield because it had better source-sink relationship, that means amount of dry matter or photosynthates produced by source organs translocated towards sink organs (economic part) and produced higher seed yield.

Therefore, cv. Aparna possessed high sink capacity to utilize the photoassimilates translocated from source. It resulted in higher seed yield. These results are commensurable to the findings of Panwar *et al.* (1986), Shrivastava and Bharadwaj (1986) and Pachpor and Shete (2010). Inter cropped Indian mustard gave seed yield by 3.20q/ha, 3.25q/ha and 6.05q/ha under T 163+ Indian mustard, Rachana+ Indian mustard and Aparna + Indian mustard, respectively.

**LER and yield advantage:** The highest LER was calculated under companion cropping of Aparna+Indian mustard by 1.14, while T 163+ Indian mustard and Rachana+Indian mustard displayed similar LER i.e., 1.03, which was lowest in comparison to Aparna+ Indian mustard treatment. The similar trend was also found in yield advantage, displayed by companion cropping system (Table 1).

**System productivity:** Aparna + Indian mustard cropping system registered highest system productivity by 35.47 q/ha. Among the companion cropping system the lowest system productivity was recorded under T 163+ Indian mustard (26.05 q/ha). Rachana+Indian mustard showed 27.97q/ha system productivity. It is worthwhile to mention here that the all tested companion cropping system exhibited the higher system productivity over their respective sole cropping (Table 1).

**System profitability:** Results given in Table1 clearly indicated that Aparna+Indian mustard gave maximum net system profitability by Rs 66820/ha. The minimum system net profitability noted under T 163+ Indian mustard (Rs 38560/ha). All the tested intercropping system proved superior over their respective sole cropping system. In general all the tested intercropping system gave better system net profitability (Table 1).

### Conclusion and Recommendation

The tested intercropping system Aparna + Indian mustard proved superior, therefore, the farm families of dry land area, may be advocated for adoption of this intercropping system for obtaining the good system productivity and net system profitability.

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